**GENERAL CONNECTED MATH SCOPE AND SEQUENCE FOR 8TH GRADE**

**1.  Thinking with Mathematical Models -**linear and inverse variations

**2.  Looking for Pythagoras -**Pythagorean theorem

**3.  Growing, Growing, Growing -**exponential relationships

**4.  Frogs, Fleas and Painted Cubes -**quadratic equations

**5.  Kaleidoscopes, Hubcaps & Mirrors -**symmetry & transformations (Don't have this, and haven’t taught it. This is one of the units Karen deemed “skippable”)

**6.  Say it with Symbols -**algebra

**7.  The Shapes of Algebra -**linear systems & inequalities (Don't have this yet, but hope we will)

**8.  Samples and Populations -**data & statistics (Don't have this, and haven’t taught it. This is one of the units Karen deemed “skippable”)

**LA PAZ CONNECTED MATH SCOPE AND SEQUENCE FOR 8TH GRADE**

**TRIMESTER I:**

**Review: Re-do Investigation 3 and 4 from Moving Straight Ahead (7th grade unit) to start off the year**

**Unit 1: Thinking with Mathematical Models – Revisiting Linear Relationships/Inverse Variation** (Students study, compare and generalize two very different patterns relating two variables)

Exploring Data Patterns

* Finding patterns and making predictions
* Extending patterns

Linear Models and Equations

* Linear models
* Equations for linear models
* Solving linear equations
* Intersecting linear models

Inverse Variation

* Relating length and width of rectangles with fixed area
* Inverse variation patterns

OVERALL OBJECTIVES:

* Recognize linear and non-linear patterns in tables and graphs and describe those patterns using words and symbolic expressions
* Write equations to express linear patterns appearing in tables, graphs and problem “stories.”
* Solve linear equations
* Model situations with inequalities
* Write equations describing inverse variation
* Use linear and inverse equations to solve problems and to make predictions and decisions

**Unit 2: Looking for Pythagoras – Pythagorean Theorem** (Students explore an important relationship about right triangles that connects algebra and geometry, called the Pythagorean Theorem)

Coordinate Grids

* Locating points and finding distances
* Shapes on a coordinate grid
* Finding areas

“Squaring Off”

* Square roots
* Using squares to find lengths

The Pythagorean Theorem

* Pythagorean Theorem
* A proof of the Pythagorean Theorem
* Finding missing sides
* Measuring the Egyptian way: Lengths that form a right angle.

Applying the Pythagorean Theorem

* Analyzing the Wheel of Theodorus
* Finding unknown side lengths (30, 60, 90 triangles)
* Analyzing triangles
* Finding the perimeter of triangles with an unknown side

OVERALL OBJECTIVES:

* Relate the area of a square to the length of a side of the square
* Estimate square roots
* Develop strategies for finding the distance between two points on a coordinate grid
* Understand and apply the Pythagorean Theorem
* Use the Pythagorean Theorem to solve a variety of problems

**TRIMESTER II:**

**Unit 3: Growing, Growing, Growing – Exponential relationships** (Students make sense of exponential relationships)

Exponential relationships

* Representing exponential relationships
* Growth factor
* Comparing exponential and linear relationships

Examining Growth Patterns

* Exponential growth with y-intercepts other than 1
* Interpreting exponential relationships
* Interpreting exponential graphs

Growth Factors and Growth Rates

* Fractional growth factors
* Growth rates
* Connecting growth rate and growth factor

Exponential Decay

* Representing exponential decay
* Modeling exponential decay

Patterns with Exponents

* Predicting the ones digit
* Operating with exponents
* Exploring exponential equations

OVERALL OBJECTIVES:

* Recognize situations where one variable is an exponential function of another variable
* Recognize the connections between exponential equations and growth patterns in tables and graphs of those relations
* Construct equations to express exponential patterns that appear in data tables, graphs and problem conditions
* Understand and apply the rules of operating on numerical expressions with exponents
* Solve problems about exponential growth and decay in a variety of situations such as sciences or businesses
* Compare exponential and linear relationships

**Unit 4: Frogs, Fleas and Painted Cubes – Quadratic relationships** (Students explore an important type of non-linear relationship, quadratic functions)

Quadratic Relationships

* Reading graphs and tables
* Writing quadratic equations

Quadratic Expressions

* Representing areas of rectangles
* Quadratic expressions
* The distributive property
* Factoring quadratic expressions
* Parabolas

Quadratic Patterns of Change

* Exploring triangular numbers
* Other quadratic relationships
* Examining patterns of change

What is a Quadratic Function?

* Interpreting a table and an equation
* Comparing quadratic relationships
* Functions and patterns of change

OVERALL OBJECTIVES:

* Recognize the patterns of change for quadratic relationships in a table, graph, equation and problem situation
* Construct equations to express quadratic relationships that appear in tables, graphs and problem situations
* Recognize the connections between quadratic equations and patterns in tables and graphs of those relationships
* Use quadratic tables, graphs, and equations to locate maximum and minimum values of a dependent variable and the x and y-intercepts and other important features of parabolas, the graphs of quadratic relationships
* Recognize equivalent symbolic expressions for the dependent variable in quadratic relationships
* Use the distributive property to write equivalent quadratic expressions in factored form or expanded form
* Use tables, graphs, and equations of quadratic relations to solve problems in a variety of situations from geometry, science and business
* Compare properties of quadratic, linear and exponential relationships

**TRIMESTER III:**

**Unit 5: Say it with Symbols** (Students make sense of symbolic representations, and solve for variables in various types of equations)

Equivalent Expressions

* Writing equivalent expressions
* Determining equivalence
* Interpreting expressions
* Revisiting the distributive property

Combining Expressions

* Adding expressions
* Substituting equivalent expressions
* Area and profit: What’s the connection? (Using equations)

Solving Equations

* Revisiting solving linear equations
* Revisiting factoring quadratic expressions
* Solving quadratic equations

Looking at Patterns of Change

* Sorting functions

Reasoning with Symbols

* Using algebra to solve a problem
* Revisit odds and evens
* Squaring odd numbers

OVERALL OBJECTIVES:

* Model situations with symbolic statements
* Write equivalent expressions
* Determine if different symbolic expressions are mathematically equivalent
* Interpret the information equivalent expressions represent in a given context
* Determine which equivalent expression to use to answer particular questions
* Solve linear equations involving parentheses
* Solve quadratic equations by factoring
* Use equations to make predictions and decisions
* Scan an equation to make estimates of the patterns that would emerge in tabular or graphic representations
* Understand how and when symbols should be used to display relationships, generalizations, and proof.

**Unit 6: The Shapes of Algebra** (Students capitalize on the strong connections between algebra and geometry in order to extend their understanding and skill in several significant aspects)

Equations for Circles and Polygons

* Equations for circles
* Parallels and perpendiculars
* Finding midpoints

Linear Equations and Inequalities

* Graphs of linear systems
* Linear inequalities
* Solving linear inequalities

Equations with Two or More Variables

* Solving equations with two variables
* Connecting y=mx + b and ax + by = c
* Intersections of lines

Solving Systems of Linear Equations Symbolically

* The y=mx + b case
* The ax + by = c case: Solving systems by writing
* Solving systems by substitution
* Solving systems by combination

Linear Inequalities

* Solving linear inequalities by graphing
* Graphs of linear inequalities
* Systems of linear inequalities

OVERALL OBJECTIVES

* Create and use equations of circles
* Determine if lines are parallel or perpendicular by looking at patterns in their graphs, vertex, coordinates, and equations
* Find midpoints of line segments and use midpoint relationship to deduce further properties of triangles and quadrilaterals
* Write inequalities that satisfy given situations
* Find solutions to inequalities when given a graph or an equation
* Solve linear systems and find intersections of lines and equations through graphing, combination and substitution
* Choose strategically among the three algebraic methods studied, which to use for a particular system of linear equations
* Write linear equalities in two variables to match constraints in problem conditions
* Graph linear inequalities in two variables and systems of such conditions and use the results to solve problems